MODIS SENSOR CONCERNS

CONCERN	CONSEQUENCE	STATUS
E2-NIR Lens (PFM and following instruments)	High Scatter, Poor Cloud Edge Response; exceeds transient response specification; significant impact to ocean science.	SBRC pricing repair, Jim Young now recommends we do it, requires about 3 weeks for replacement.
E1-VIS-sapphire lens (FM-1)	High Scatter, Poor Cloud Edge Response; exceeds transient response specification; significant impact to ocean science.	SBRC estimates replacement impact similar to NIR; SBRC will request waiver without GSFC encouraging SBRC to take alternative path; decision pending.
Scan Mirror (SM) Surface Quality (PFM)	Contributes 10-50% of Near Field and Far Field Scatter	Retrofit with FM-1 SM to be evaluated; quality of FM-1 SM TBD.
Primary Mirror, Fold Mirror Surface Quality (PFM)	Scatter from both similar to Scan Mirror scatter.	Quotes for improved optics for FM-1 in process; retrofit for PFM to be evaluated.
Thermal Channels cold shields (PFM)	High infrared radiation background	Redesign complete, performance verification expected in a few weeks. Potential ghosting increase a concern.
SDSM Detector Radiation Sensitivity	Noise in calibration data	Engineering data required for GSFC analysis.
CROSS-TALK (PFM) B1-B2	Compromises calibration	SBRC inverted filter mask for PFM; data analysis TBD.

B5-B6-B7 from B21-B22 region	Compromises calibration	Ghosting reduction due to SW/MWIR Intermediate Filter Assembly may eliminate this; TBD.
B27-B33 leak	Compromises calibration	Black paint stripe on FPA completed. GSFC has not seen the data yet.
B31-B36	Compromises calibration	SBRC uncertain - saw cut on PFM may fix problem seen in E; GSFC model for ghosting shows effect in ghosting; model output sent to SBRC for their evaluation; results expected in a few weeks.
SPECTRAL FILTERS		
B26 (PFM)	Out-of-specification spectral bandpass strongly effects thin cirrus cloud products	Yes to FM-1; PFM replacement under consideration.
TESTING		
Particulate cleanliness	Very strong effect on scatter, cloud edge response	EM practices and procedures insufficient. Increase emphasis for PFM TBD; an issue at LM also.
Point-spread-function	Required for image verification, only avenue to approach required cloud edge response.	SBRC plans scan and track line-spread-functions; sufficiency TBD; critical issue.
Scan Mirror Angular Emissivity	Critical to thermal calibration	Approach demonstrated on EM inadequate; SBRC proposed improvement of doubtful value.

Ice on cooler optics	Loss of SNR and impact to calibration	SBRC analysis confirms presence of ice on EM; revised bakeout and purging procedures TBD.
Test Schedule	Incomplete characterization and calibration; late delivery	Too many tests for allotted per current Valley Forge "need date"; current need date may not be realistic; SBRC planning reduced Test Plan.
NIST traceability (Thermal)	Calibration Accuracy	MCST investigating secondary approaches; SBRC emissivity measurement BCS traceability TBD.
Test Levels (Thermal/Vacuum)	Data for developing calibration coefficients may not be acquired	MCST gathering information on experience from GOES; additional test temperature combinations require less than 1 week.
Solar-Based Radiation Calibration; system level scattered light effects	Calibration accuracy; SBRC models show there may be 1 percent contamination scatter	Not yet in baseline; availability of U. AZ heliostat TBD, Hongwoo Park investigating for MCST.

PFM SI&T PLAN

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- INITIAL SI&T TEST PLANS INDICATED ≈282 TESTS WOULD BE REQUIRED FOR COMPREHENSIVE & LIMITED PERFORMANCE TESTING THE PFM INSTRUMENT, INCLUDING:
  - 12 - AFT-OPTICS ASSEMBLY TESTS
  - 66 - AMBIENT TESTS IN THE HI-BAY CLEAN ROOM
  - 75 - OFFSITE ENVIRONMENTAL TESTS/RETESTS
  - 23 - AMBIENT TESTS IN MODIS CALIBRATION CHAMBER
  - 82 - THERMAL-VACUUM PERFORMANCE TESTS IN MCC
  - 14 - POST-THERMAL VACUUM RETESTS
- @ 2.1-DAYS/TEST (≈EM AVERAGE), REQUIRES ≈2.4 WORKING YEARS (≈29 MO) TO COMPLETE MODIS PFM
- TESTS 9-13 PRESENTLY IN WORK; LEAVES 269 TESTS INDICATING PFM DELIVERY 1 NOV 1997
- CLEARLY UNACCEPTABLE TO BOTH SBRC & GSFC

PFM SI&T TEST REPLAN

TLK - 5
8/30/95

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- A TEST REPLAN IS IN PROGRESS - THE INTENT:
  - REDUCE THE NUMBER AND SCOPE OF TESTS TO THOSE REQUIRED TO MEET PERFORMANCE SPECIFICATIONS AND PRESERVE THE INTEGRITY OF THE TEST SYSTEM & ITS CALIBRATION
  - I.e., TEST WHEN NECESSARY, NOT - TEST FOR THE SAKE OF TESTING
- PRESENTLY REDUCED TO 190 TESTS, INCLUDING :
  - 12 - AFT-OPTICS ASSEMBLY TESTS
  - 62 - AMBIENT TESTS IN THE HI-BAY CLEAN ROOM
  - 23 - OFFSITE ENVIRONMENTAL TESTS/RETESTS
  - 25 - AMBIENT TESTS IN MODIS CALIBRATION CHAMBER
  - 59 - THERMAL-VACUUM PERFORMANCE TESTS
  - 9 - POST-THERMAL VACUUM RETESTS
  - 190 - TOTAL TESTS REQUIRED
- @ 2.1-DAYS/TEST = 19.3 MONTHS OR 21 APRIL 1997
- STILL UNACCEPTABLE - THUS, REPLAN IS CONTINUING

MODIS PROTOFLIGHT MODEL SI&T FLOW PLAN

TLK - 7
8/30/95

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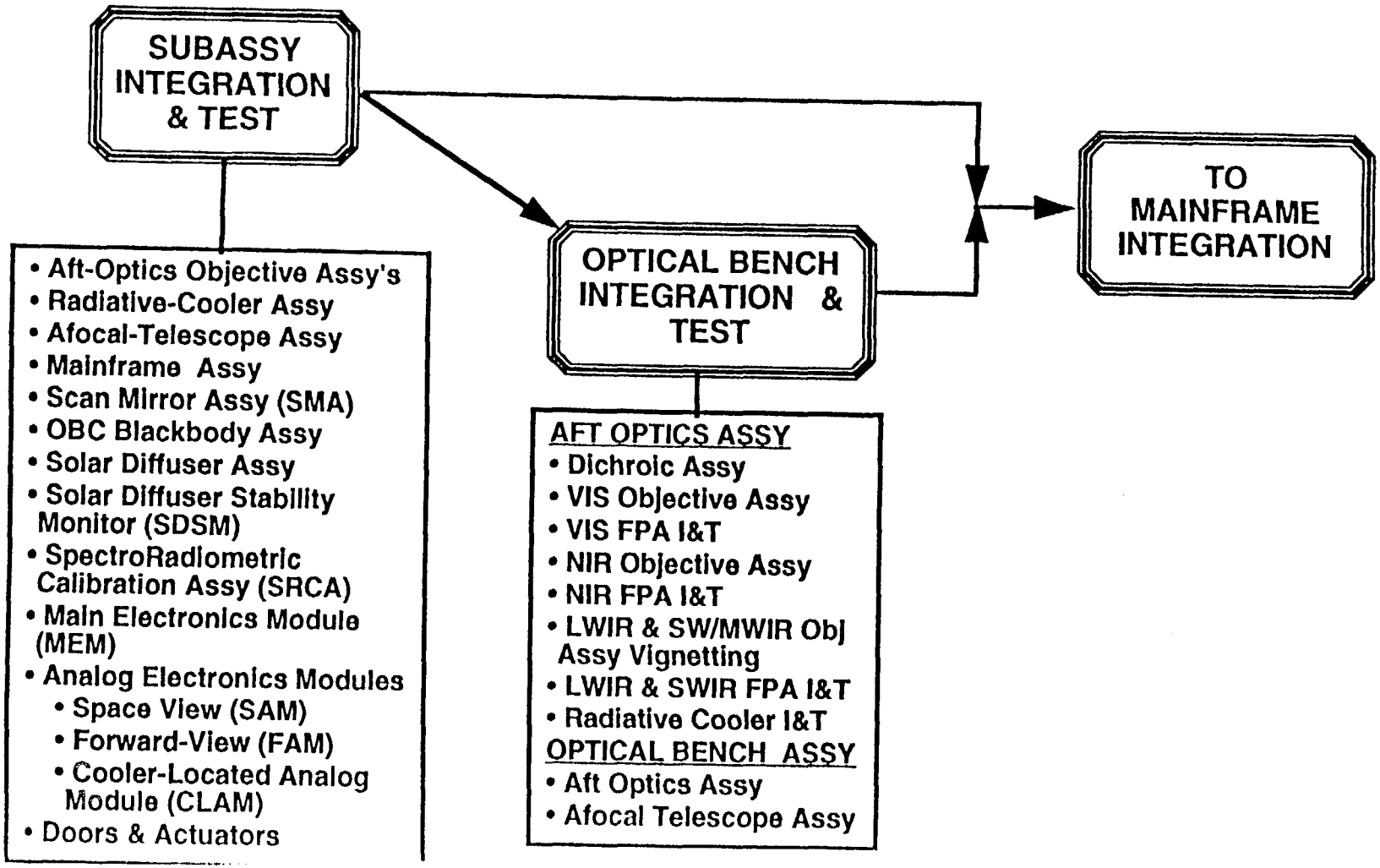

PFM SI&T AMBIENT LAB TEST FLOW PLAN

TLK - 8
8/30/95

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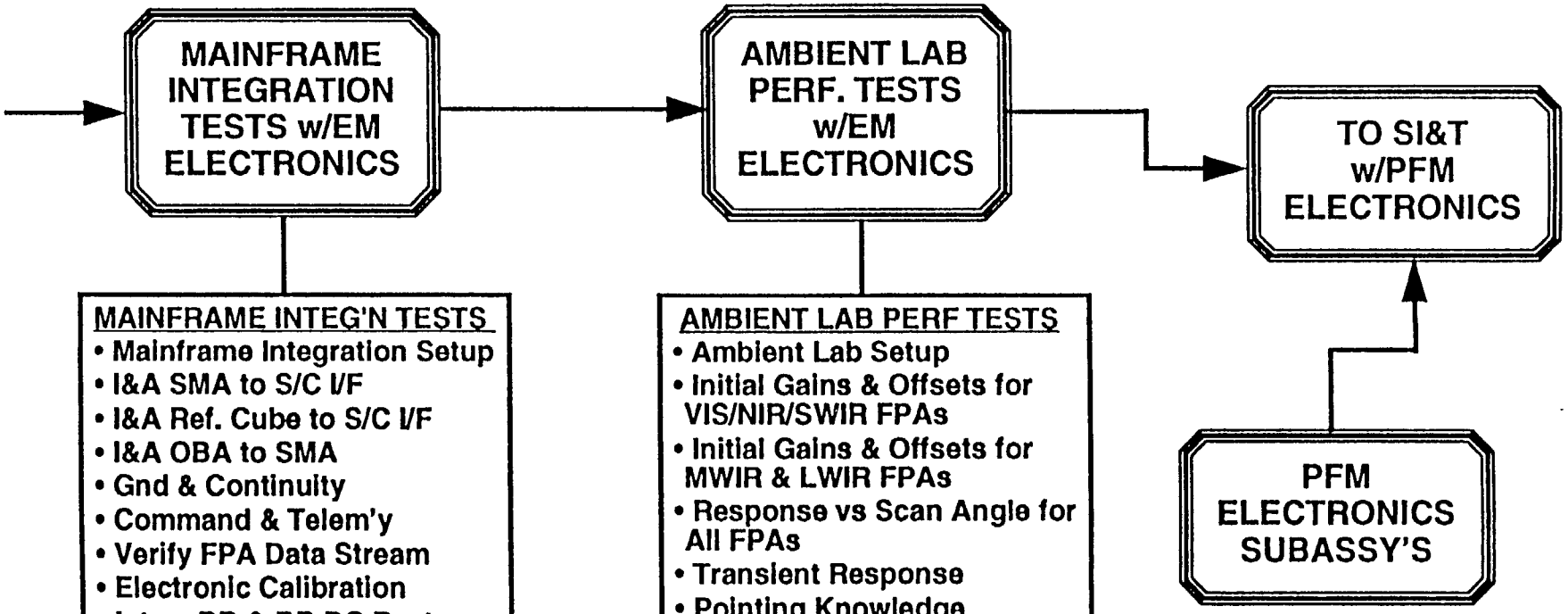

MAINFRAME INTEG'N TESTS
- Mainframe Integration Setup
- I&A SMA to S/C I/F
- I&A Ref. Cube to S/C I/F
- I&A OBA to SMA
- Gnd & Continuity
- Command & Telem'y
- Verify FPA Data Stream
- Electronic Calibration
- Integ. BB & BB DC Restore
- I&A SD
- I&A SDSM
- SMA Performance Trkg
- Align MODIS to Ref Cube

AMBIENT LAB PERF TESTS
- Ambient Lab Setup
- Initial Gains & Offsets for VIS/NIR/SWIR FPAs
- Initial Gains & Offsets for MWIR & LWIR FPAs
- Response vs Scan Angle for All FPAs
- Transient Response
- Pointing Knowledge
- Polarization Insensitivity
- Brt & Drk Targets w/in Field
- Warm Targets w/in Field
- Stray Light Rejection

PFM SI&T AMBIENT LAB TEST FLOW PLAN - CONTINUED -

TLK - 10
8/30/95

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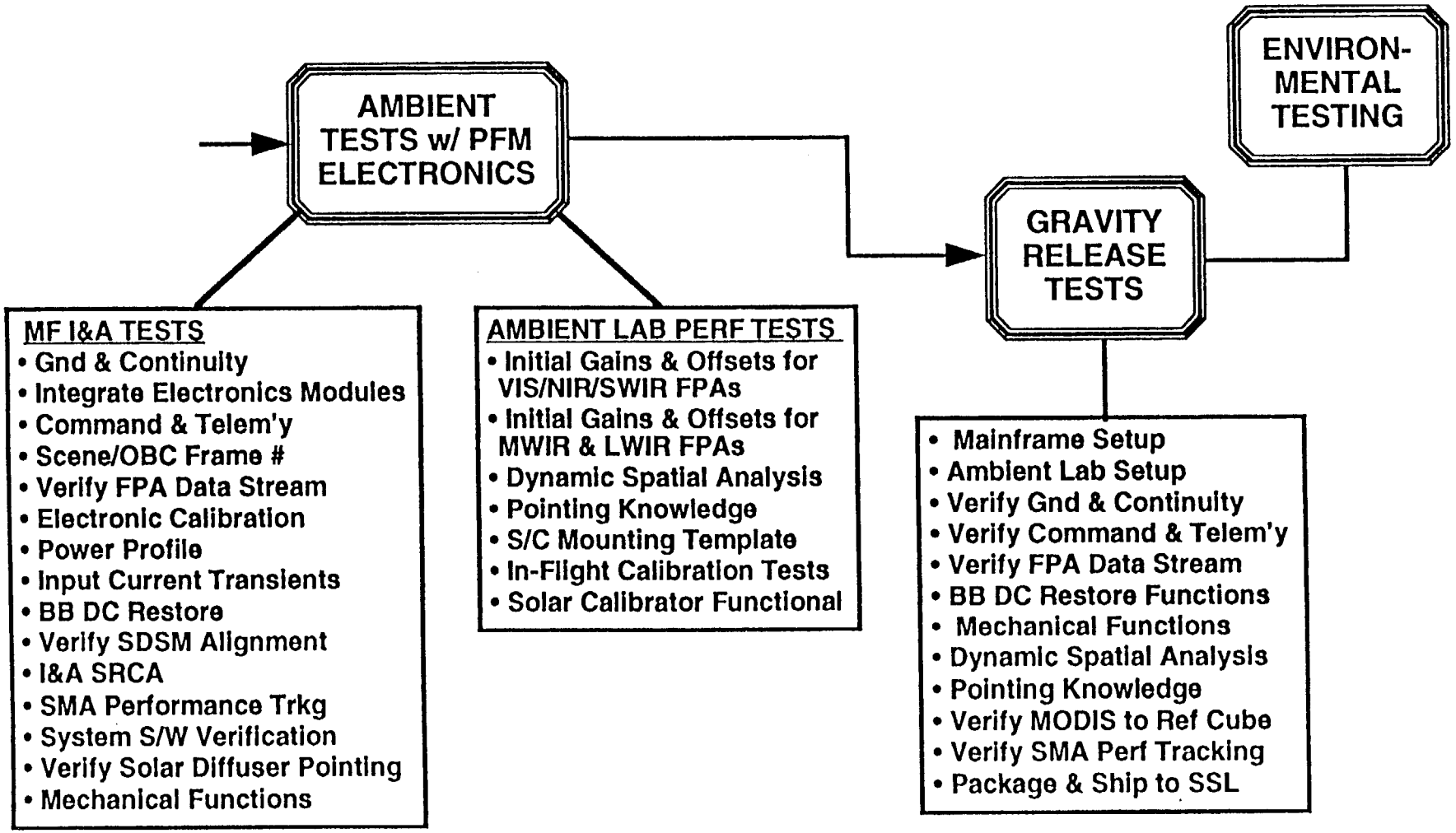

PFM SI&T OFFSITE ENVIRONMENTAL TEST FLOW PLAN

TLK - 11
8/30/95

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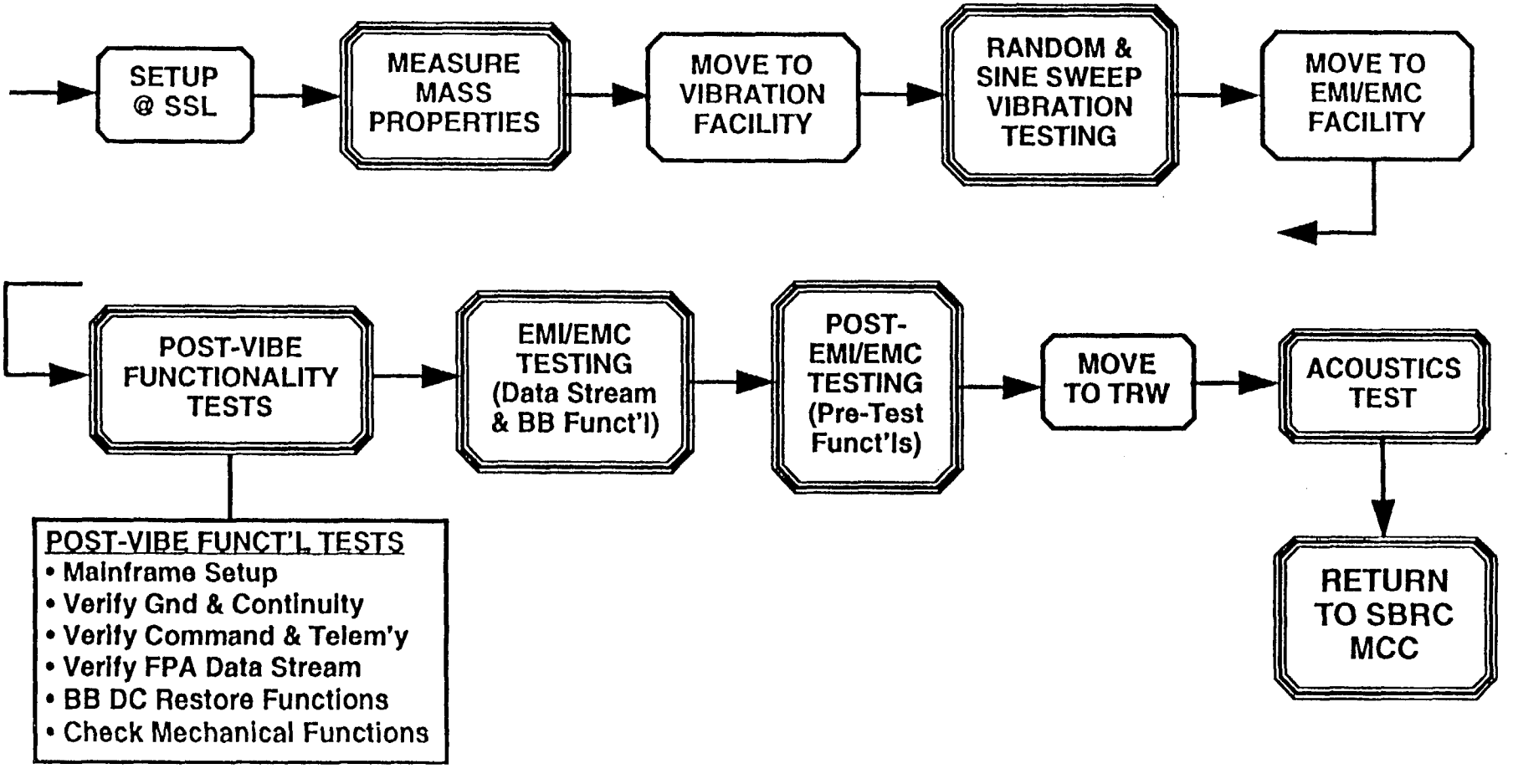

MODIS PFM MCC SI&T AMBIENT TEST FLOW PLAN

TLK - 12
8/30/95

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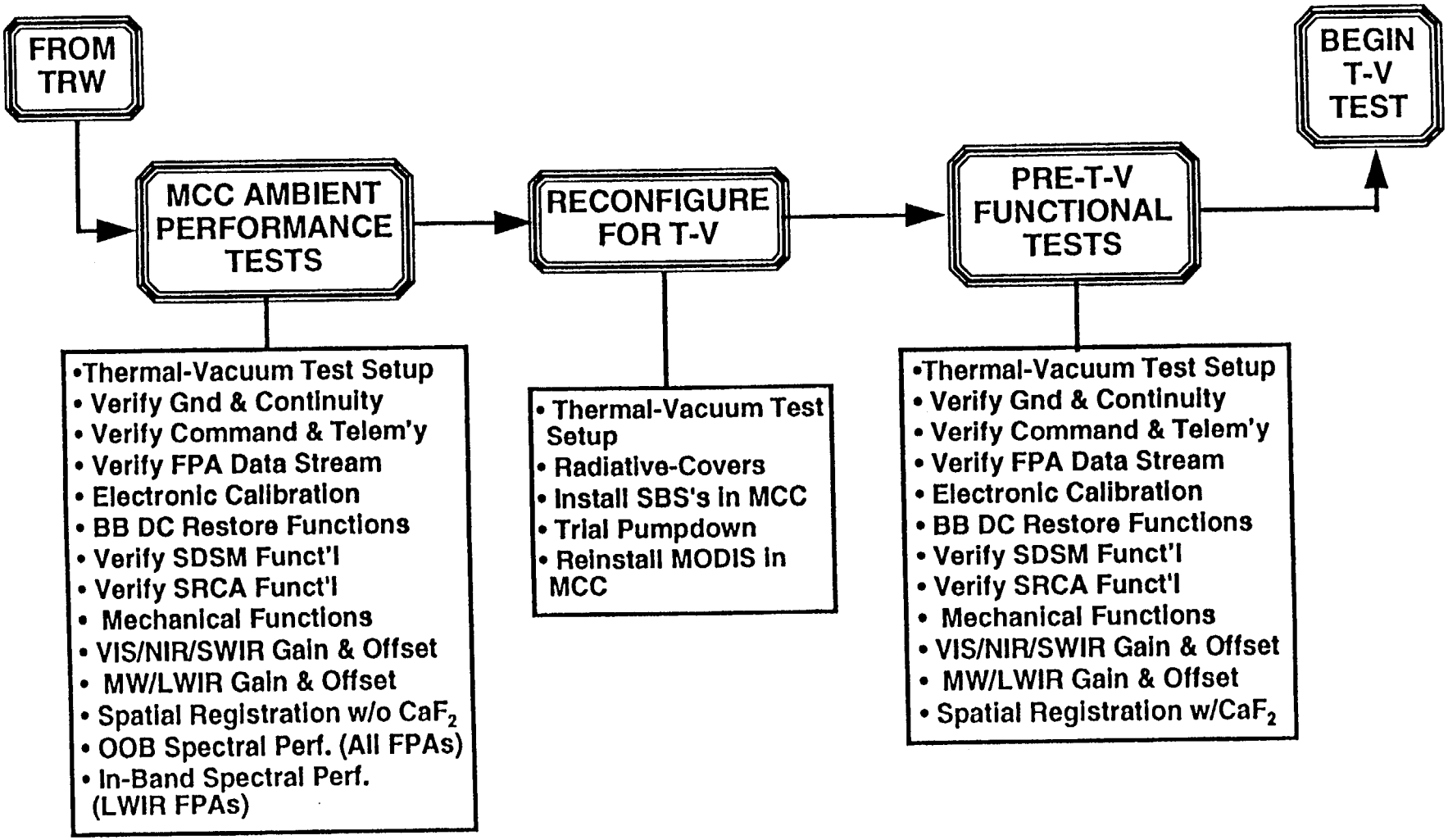

MODIS PFM SI&T THERMAL-VACUUM TEST FLOW PLAN

TLK - 13
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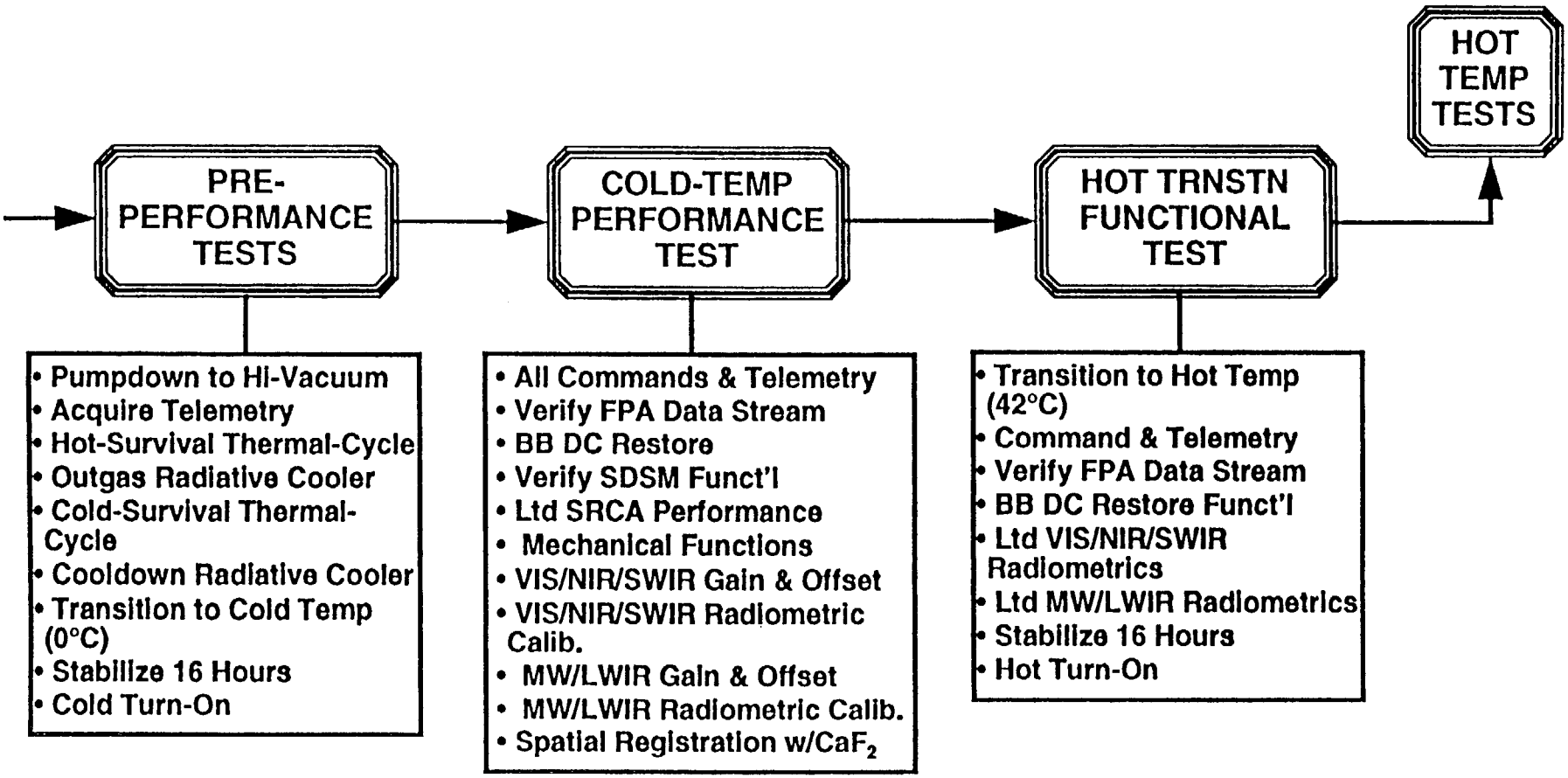

MODIS PFM SI&T THERMAL-VACUUM TEST FLOW PLAN

TLK - 14
8/30/95

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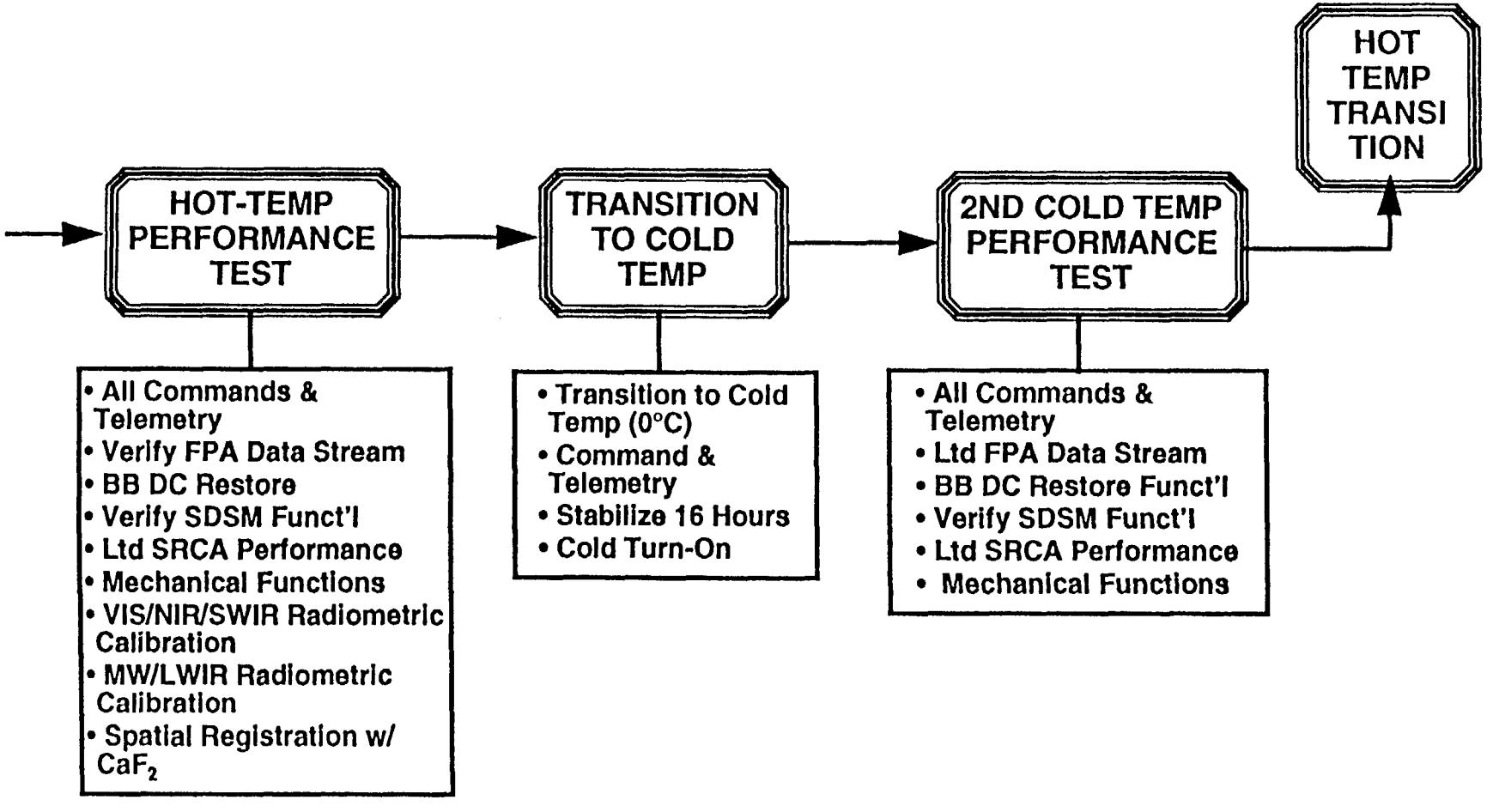

MODIS PFM SI&T THERMAL-VACUUM TEST FLOW PLAN

TLK - 15
8/30/95

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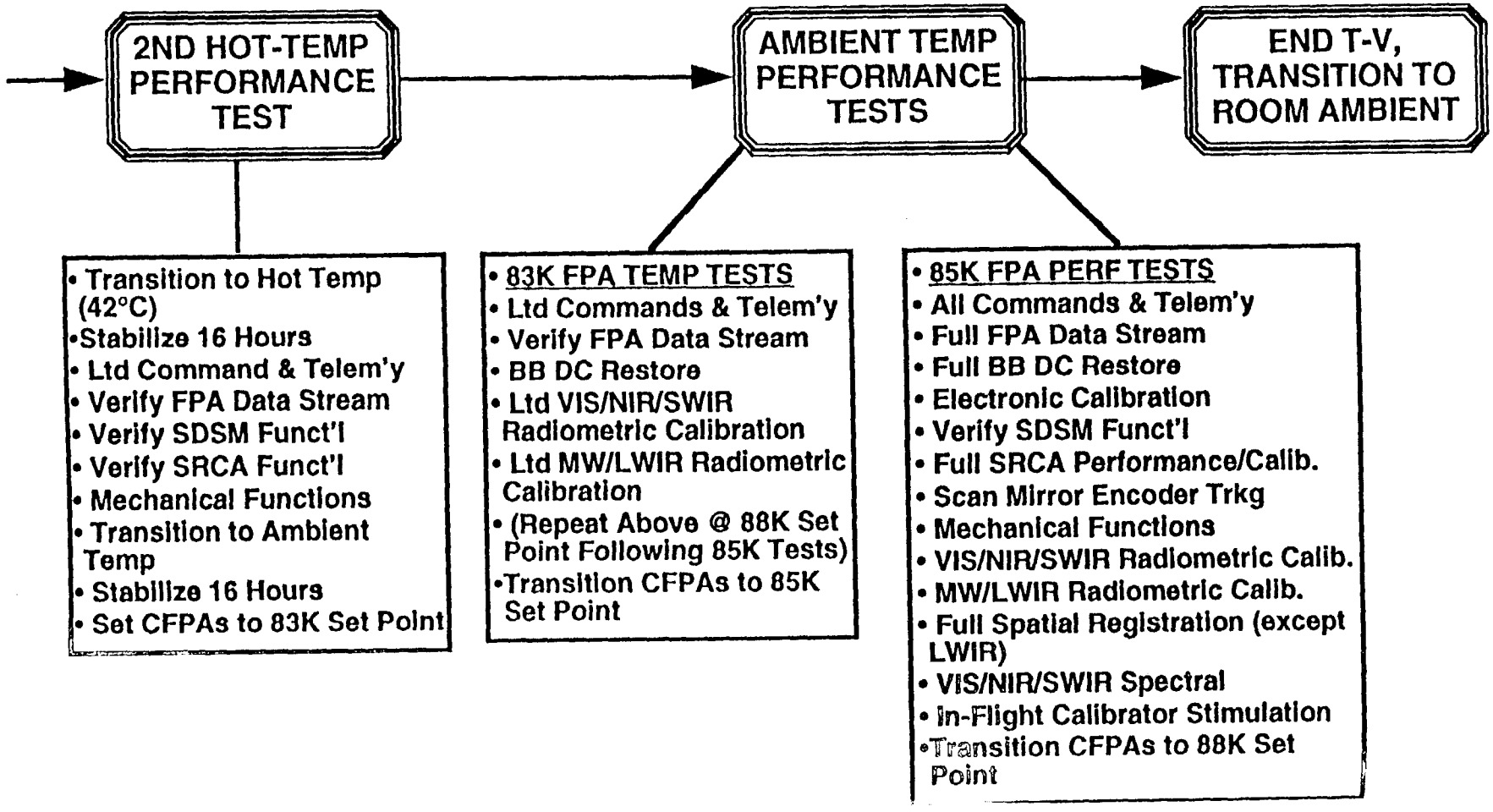

PFM SI&T POST- T-V TEST FLOW PLAN

TLK - 17
8/30/95

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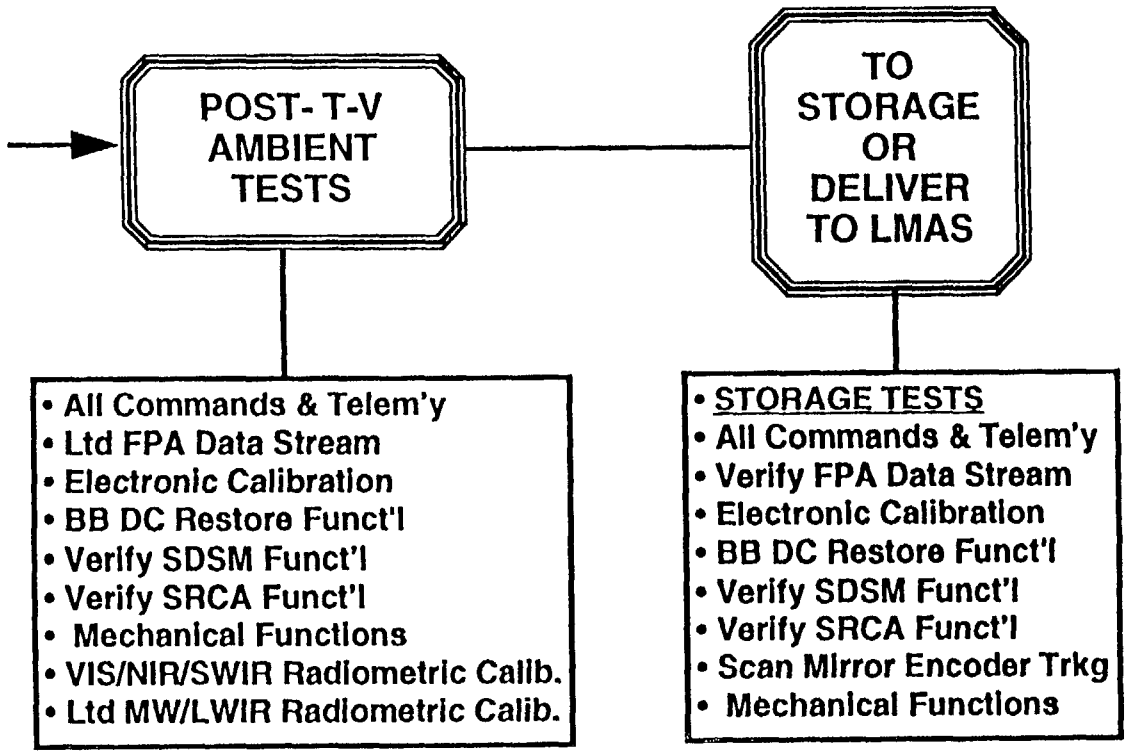

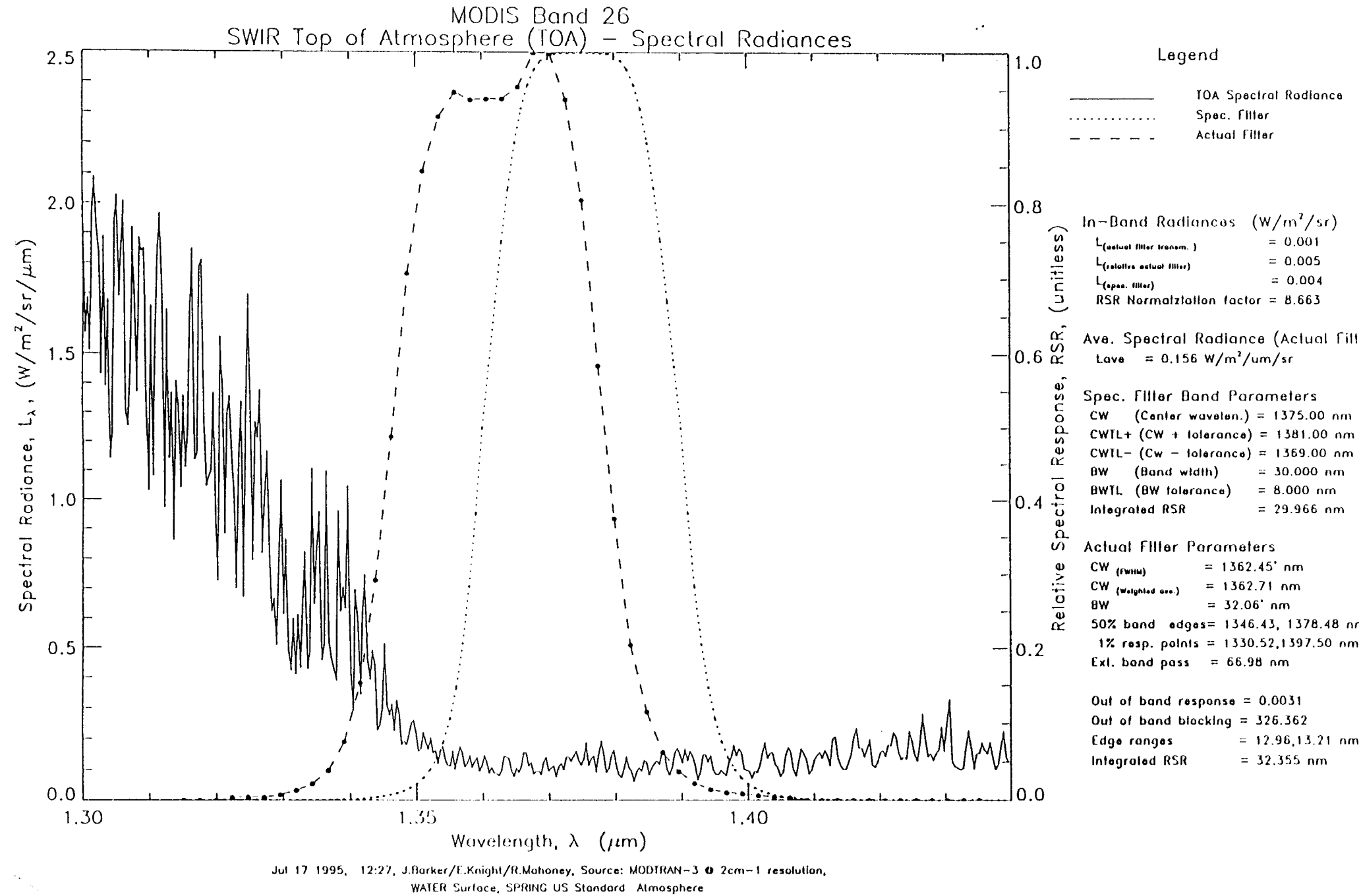

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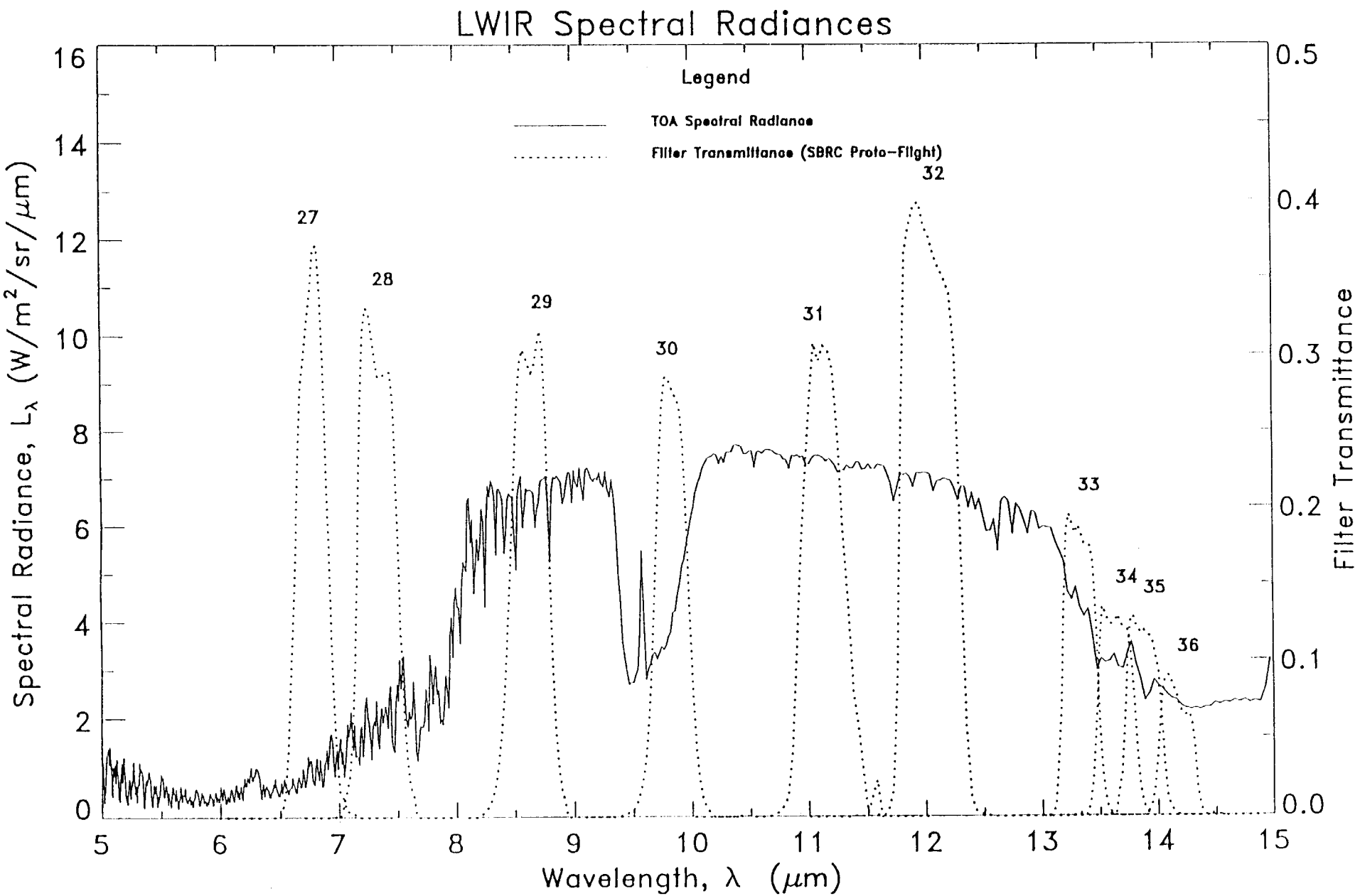
WATER Surface, SPRING US Standard Atmosphere



Aug 9 1995, 14:47, J.Barker/E.Knight/R.Mahoney, MODTRAN-3 @ 2cm-1 resolution,
Atmosphere: US Standard Atmosphere, Water Surface (J.F.Mustard, Brown Univ., 1991 AVIRIS Work Shop)

Quality Assurance Procedure For EOS Products

MODIS Technical Team Meeting

ESDIS Science Office
Bob Lutz
September 1 1995

Contents of Presentation

Introduction :

- Objectives
- History

Definitions :

- Quality control and QA
- Classes of users : Producers/Consumers

Implementation :

- Instrument teams (ITs) - (Producers and Consumers)
- IDS teams / User Community - (Consumers)

Summary :

- Conclusion and Suggested IT QA Plan Schedule

Introduction

Objective :

- To develop a coordinated approach to the application of quality assurance methodology within the generation of EOS products, as well as to develop a rational method for archiving the statistics.

History :

- Issue raised at Data Processing Focus Team (DPFT) - April 1994
- EOSDIS Project Science Office (S. Wharton) assumed the task of scoping the work
- Issue has transitioned over to ESDIS Science Office (H. K. Ramapriyan) for further development
- Four drafts written and circulated amongst the ITs and DAACs (Fourth draft - June 1995)
- Portions of this material were (will be) presented at SSI&T Workshop (April 1995), MISR (June 1995) and CERES (Sept. 1995) Science Mtgs.

Definitions :

Quality control of EOS Products :

EOS Data Quality Panel (5/95) has proposed that Quality Control be composed of 3 Parts :

- Calibration
- Quality Assurance
- Validation

Proposed QA Definition :

- Identify and flag products that significantly do not conform to the expected accuracies of the particular data type
- Process can be done in operational processing time (before product is made accessible to the general public) and consists of 3 Steps

- 1) QA within algorithm processing software - automated (in-line)
- 2) QA done at the DAAC - automated & off-line(?)
- 3) QA done at the SCF - automated & off-line(?)

- QA information may be stored within the metadata, within the product and/or external to the product.

QA Products Utilized By Producers and Consumers :

Producers :

- **Data Producing ITs** - Internally use their own QA to monitor the health of their products.

Consumers :

- **Data Dependent ITs** - Ingesting incoming QA from other ITs within operational time-frame.
- **Interdisciplinary science (IDS) teams and other non-EOS funded researchers** - Extensive use of sub-granule QA for generation of higher level products and other research activities.
- **General User Community** - Will use granule level QA to screen data for ordering purposes.

Implementation :

Two stage iterative process that will include the ITs, the DAACs, the IDS teams and the general user community

- **First stage - data gathered independently from each group - then compiled and exchanged**
- **Workshop convened - representatives from all groups will participate in the development of a project-wide QA approach**
- **Second stage - each group fine tunes its' own individual plans to accommadate the needs of others**

Implementation :

ITs and DAACs (Producers and Consumers) :

- **To define QA procedures, products and needs :**

  QA Plan generated by each IT with their DAAC(s)

- **Proposed straw man generic QA Plan :**

General Section
Roles and responsibilities
Scenario of QA Process
Overall DAAC/SCF Network transfer rates

Detailed Section
Individual product QA characteristics
QA requirements from incoming products from other ITs

- **Proposed schedule for writing of the QA Plans:**

The completion of these plans would be a three step sequence, to coincide with the need of greater QA information for IT deliveries - first two steps completed before the workshop

1) Before Beta delivery (before January 1996) - General part of Plan completed

- Aid in the development of ECS IR-1 (Clarification of roles and responsibilites of DAACs and SCFs regarding QA process)

2) Before Version 1 delivery (before January 1997) - Draft QA Plans generated/workshop convened

- Provide a vehicle for ITs to "learn" from each other in regards to the varying applications of QA techniques
- Allow data dependent ITs to plan for the ingest of incoming QA from other ITs before Version 1
- Allow IDS teams/science community to comment on the proposed QA information generated by the ITs

3) Before Version 2 delivery (before November 1997) - Final QA Plans generated

4) Updates as needed during the operational phase

Implementation (cont'd)

IDS Teams :

QA questionnaires (abbreviated) completed by each IDS team - coordinated by AHWGC

- Desired QA with incoming EOS Products (resolution, content)

General User Community :

The science community (e.g. through members of the DAAC UWGs) would be solicited for comments related to the proposed QA methodology after the generation of draft QA Plans. This would include topics such as :

- Organization/Content

- of QA within the metadata
- of QA contained within product and external to product (separate QA product)

Summary

- The ESDIS Science Office is attempting to provide the framework in order to : understand the operational QA methodology utilized by the ITs, identify the QA requirements of the users of the data products, and to ensure that EOSDIS satisfies the requirements of both these communities.

- Development of the QA Plan is an iterative process

General - October 1995
Draft Plans - June 1996
Workshop - September 1996
Final QA Plans - April 1997

- IDS Teams

Questionnaires distributed - January 1996
Questionnaires returned - June 1996
Workshop - September 1996

Bob Lutz / ESDIS Science Office
E-Mail : rlutz@ltpmail.gsfc.nasa.gov/ Phone : 301-286-7339

Proposed QA Plan for Instrument Teams and DAACs

- **General :**

1) The definition of the pre launch QA process on simulated data.

2) General description of the responsibilities of the instrument teams and the DAACs within the complete procedure of the QA process. This high-level view of the QA process should also attempt to address the evolutionary nature of the QA process (i.e., how the roles of the instrument teams and the DAACs may change in time as the system stabilizes and the algorithms become more robust). A brief operational scenario would also be very beneficial within this section.

3) The percentage of each data product that will be transferred between the DAAC and the SCF for QA purposes. An overall transfer rate (i.e. : for all products) between the instrument team and their DAAC(s) would be an alternate specification.

Proposed QA Plan for Instrument Teams and DAACs (con't)

- **Specific:**

A) For each step in the envisioned QA process (this may be different for each product):

1) The overall methodology of the QA process (i.e., statistical, visual....).
2) The expected percentage of the data product that would be examined within this step.
3) All of the parameters/results generated from the QA process and how they should be interpreted. (i.e., types of flags, variables calculated, resolution of the QA parameter, etc. ....).
4) The parameters/results from 3 that are expected to be stored in the metadata.
5) The parameters/results from 3 that are expected to be stored in the product.
6) The parameters/results from 3 that are expected to be stored in a separate QA product.
7) The response to the QA process
8) The expected time frame for the QA process.
9) The resources needed/expected for the QA process. This would include computational, financial, and people-power requirements.

Also, a prioritization of the QA process if funding is limited.

B) Desired QA from other ITs generating EOS products (i.e. : data incoming from other ITs in the operational time window)
   1) Name of IT and Product
      a)Desired QA statistics
      b)Desired resolution of QA statistics (i.e. : by data point, granule ...)